ASSOCIATED COMMUNICATIONS, L.L.C.

Executive Summary/Backgrounder

INTRODUCTION

Associated Communications, L.L.C. will market broadband wireless multimedia local services and manage broadband full-service competitive local exchange carrier (CLEC) networks that offer voice, high-speed data, Internet access and video conferencing facilities and services, initially at 18 GHz frequencies in the top 31 metropolitan areas in the United States. These networks will provide an integral component of a fully integrated suite of switched and dedicated communications services, including local exchange, long distance and long distance access, Internet access, private wide-area networking, and video conferencing services to a broad base of business and residential customers.

Associated Communications is providing construction, operation, management, and marketing services for these new telecommunications networks licensed to its affiliate, Microwave Services, Inc. (MSI). In addition, Associated Communications is providing the same support services for Digital Services Corporation (DSC), which holds licenses to offer similar broadband services in most of the same markets as MSI, plus several other markets. Both Associated Communications and MSI are controlled by The Associated Group, Inc., a diversified communications services company. DSC is a minority interest holder in Associated Communications and is controlled by the founders of Telcom Ventures, L.L.C. and LCC, L.L.C., one of the world's largest wireless consulting firms The Carlyle Group and the Singh family are the primary investors in Telcom Ventures.

LICENSED SPECTRUM

Associated Communications will manage the CLEC networks utilizing spectrum which has been licensed to MSI and DSC by the Federal Communications Commission ("FCC"). MSI and DSC hold licenses for the exclusive use of approximately 80 to 100 MHz in the 18-19 GHz spectrum band in most of the top 31 Standard Metropolitan Statistical Area ("SMSAs"). MSI, DSC and Associated Communications are utilizing the portion of the 18-19 GHz band that was designated in 1981 by the FCC as the Digital Electronic Message Service ("DEMS") band. The DEMS band rules allow a licensee to use its licensed frequency pairs for two-way, "cellular-like" point-to-multipoint digital services to fixed user stations on an exclusive basis throughout its SMSA. SMSAs, as defined by the Department of Commerce, were the precursor to today's Metropolitan Statistical Areas ("MSAs") and were in existence when the DEMS band was formed in 1981. Boundary definitions of SMSAs are similar, but not exactly the same as, the boundaries for today's MSAs. MSI and DSC are initially constructing networks in SMSAs which cover approximately 3.5 million businesses, 33.5 million households representing over 90 million in population, and areas with over $45 billion in revenues from annual local telecommunications service alone.

SERVICES OFFERED

Utilizing both traditional point-to-point microwave technology and advanced two-way, point-to-multipoint wireless access technology, MSI, DSC and Associated Communications believes they can cost-effectively market a complete bundle of telecommunications services to a broad base of business and residential customers. These services will include local switched and dedicated telephone service, Internet access, high-speed data and high quality video conferencing.

Associated Communications believes that spectrum reuse and efficient network infrastructure will provide for enough capacity to accommodate significant demand for the foreseeable future. The CLEC networks are designed to support major telecommunications standards and integrate seamlessly with existing customer and network equipment. Because the systems are wireless, MSI, DSC and Associated Communications will be able to deploy their networks and make their services available to customers much more rapidly than can new facilities-based wireline competitors.

INFRASTRUCTURE

The networks of radio "nodal sites" throughout each market will be similar to those of cellular networks. Nodal sites will be interconnected with switching and routing infrastructure using both wired and wireless links. The deployment of these nodal sites will provide for a significant coverage area in each market. With the nodal sites deployed in advance, each additional customer can be added comparatively quickly and inexpensively by installing a small antenna at the customer's site, mounted either on the roof, on the side of the building, or even near a window inside the building. Unlike point-to-point microwave systems, a DEMS system may also be point-to-multipoint, which allows nodal sector radios and antennae to be shared simultaneously among many customer site radios. The networks will employ sectorization and frequency reuse to achieve capacity sufficient to offer high speed services to many customers within the same sector. By sharing nodal equipment and customer site equipment among many end users and using sectorization, a single cell site in the DEMS system can potentially serve thousands of subscribers.

REGULATORY ENVIRONMENT

The Telecommunications Act of 1996 has created a more pro-competitive environment for facilities-based competition in local telephony. In particular, the Telecom Act prohibits states and municipalities from adopting regulations that serve as barriers to competition in the local telephone service market and requires local exchange carriers, particularly the incumbent Bell Operating Companies, GTE, and other existing local carriers, to provide interconnection on rates, terms, and conditions that are just, reasonable, and nondiscriminatory. Reciprocal compensation for terminating access enables a new provider to receive remuneration for calls originating on another carrier's network and terminating on its own network. Provisions for number portability will allow customers to change local service providers without changing their phone numbers and dialing parity rules will ensure that customers of new competitors do not have to dial access codes. Associated Communications will take advantage of these opportunities created by the Telecommunications Act to compete in the provision of local telecommunications services.

The Associated Group, Inc.
Fact Sheet and Corporate Backgrounder

The Associated Group, Inc. was spun off from Associated Communications Corporation ("ACC") in December 1994 as part of a $700 million transaction to transfer ACC's domestic cellular telephone interests to SBC Communications, Inc. Prior to the spin-off, ACC owned and operated cellular systems in Buffalo, Rochester, Albany and Glens Falls, New York and held minority interests in the Pittsburgh, Pennsylvania and San Francisco-San Jose, California cellular telephone systems, collectively representing in excess of 3.6 million pops.

ACC itself was spun off from Rust Craft Greeting Cards, Inc. in 1979 as a result of the acquisition of Rust Craft by Ziff Corporation. The company was initially comprised of eleven radio stations, a New York art gallery and stock of Tele-Communications, Inc. Except for the radio stations it still holds today, the company sold its interests in the radio industry in the early 1980's, and became pioneers in the cellular telephone industry. The company's Buffalo, New York cellular system was one of the first cellular systems in the United States to become operational. By the time the cellular properties were sold in 1994, the company was the 14th largest cellular operator in the U.S.

The Associated Group continues the tradition of exploring opportunities in emerging growth businesses. The company owns and operates a variety of communications businesses and interests, including:

- Controlling equity interest in the new Associated Communications, L.L.C., a provider of broadband wireless full-service competitive local exchange carrier networks that will offer voice, high-speed data, Internet access and video conferencing facilities and services.

- Operation and development of a leading wireless location business, known as the TruePosition™ Cellular Location System. TruePosition enables wireless carriers to determine the location of any cellular or personal communications services telephone.

- Controlling equity interest in Portatel del Sureste, S.A. de C.V., the non-wireline cellular telephone system in southeastern Mexico and the Yucatan Peninsula, covering 8.2 million pops.

- Equity interest in Mobilcom, S.A. de C.V., an enhanced specialized mobile radio operator covering areas throughout Mexico.

- Operation of a digital microwave communications network in Los Angeles, California which operates as a competitive access provider of local exchange service to interexchange carriers and other businesses.

- Equity interest in Omnipoint Communications, Inc., the operator of a personal communications service business in the New York Metropolitan Trading Area covering 27 million pops, and subsidiary of Omnipoint Corporation (NASDAQ: OMPT).

- Operation of five radio broadcasting stations in Ohio.

- Ownership of a marketable equity securities portfolio, which includes approximately 20 million shares of Tele-Communications, Inc. common stock and 4.9 million shares of Liberty Media Corporation, having a current market value of approximately $430 million.

- Operation of Associated American Artists, a prominent art gallery in New York City.

Headquarters:	The Associated Group, Inc. 200 Gateway Towers Pittsburgh, PA 15222 (412) 281-1907
Officers:	Myles P. Berkman Chairman, President and Chief Executive Officer
	David J. Berkman Executive Vice President
	Richard I. Goldstein Vice President
	John K. Dion Vice President
	Scott G. Bruce General Counsel and Secretary
	Keith C. Hartman Controller and Asst. Secretary
Employees:	Over 100
Ticker:	NASDAQ: AGRPA, AGRPB

Associated Communications, L.L.C.
Technical/Orgnnizational Q&As

Q. What frequency band is the licensed spectrum located in?

A. 18 to 19 GHz band. Associated Communications manages networks and markets services on behalf of Microwave Services, Inc. (MSI), a wholly-owned subsidiary of The Associated Group, Inc., and Digital Services Corporation (DSC), pursuant to licenses granted to MSI and DSC for the exclusive use of spectrum in their SMSAs.

Q. Under what FCC regulation are these licenses issued?

A. These licenses were issued under the common carrier "Digital Electronic Message Service" (DEMS) band rules, which were a component of Part 21 of Title 47 of the Code of Federal Regulations. Effective August 1, 1996, the relevant portions of Part 21 of the FCC's rules have been consolidated into the new Part 101.

Q. What geographic areas do DEMS licenses cover?

A. DEMS common carrier licenses allow the licensee to utilize the applicable spectrum on an exclusive basis throughout the Standard Metropolitan Statistical Area ("SMSA") in which the license is granted.

Q. How does an SMSA differ from an MSA?

A. SMSAs were the precursor to today's Metropolitan Statistical Areas ("MSAs") and are very similar in terms of the areas included. SMSAs were the boundaries defined by the Office of Management and Budget ("OMB") for use by the Bureau of the Census. In the early 1980s, OMB created a new definition of metropolitan areas called MSAs which differ slightly from SMSAs. However, so-called MSAs used to define cellular geographic service areas ("cellular-modified MSAs") are actually larger than SMSAs, in that some cellular-modified MSAs include multiple regular MSAs.

Q. In how many cities will Associated Communications manage a DEMS network?

A. Initially, 31 cities, as follows:

Atlanta	Houston	Phoenix
Baltimore	Indianapolis	Portland
Boston	Kansas City	Sacramento
Chicago	Los Angeles	San Antonio
Cincinnati	Miami	San Diego
Cleveland	Milwaukee	San Francisco
Columbus	Minneapolis	San Jose
Dallas/Fort Worth	New York	St. Louis
Denver	Philadelphia	Seattle
Detroit	Pittsburgh	Tampa
		Washington D.C.

Q. When will Associated Communications begin marketing services?

A. Services are already being offered on a limited basis in most of the markets licensed to MSI and DSC and managed by Associated. Equipment has been deployed to provide high-speed point-to-point links for dedicated Internet access and other transport services. The construction and deployment process is continuing. Associated will be testing advanced broadband point-to-multipoint technology starting in the second half of 1996 and expects to offer commercial service utilizing this service by mid-1997.

Q. What are the advantages of using point-to-multipoint technology?

A. Point-to-multipoint technology allows for much greater sharing of infrastructure and therefore much lower costs per subscriber. It also makes it easy to serve multiple customers from a single site, allowing virtually no configuration at the nodal site, only at the user site.

Q. Are the technologies being used analog or digital?

A. All equipment being deployed is digital.

Q. Does a DEMS network require line-of-sight between a nodal station site and the customer's site?

A. Yes. In order to ensure that it is able to reach customers, Associated Communications will manage mesh-like cellular networks whereby each customer is within range of multiple nodal station sites. Associated Communications will also utilize inexpensive repeaters to reach areas which are otherwise blocked. Such networks will ensure that virtually all potential customers can be serviced with wireless facilities.

Q. How does this infrastructure differ from that being deployed by PCS operators?

A. PCS operators are deploying infrastructure that serves mobile subscribers. DEMS infrastructure serves fixed subscribers with very high bandwidth needs, on an as-needed basis. This permits the provision of dozens of voice lines, as well as multi-megabit data (including Internet access) and video conferencing, via a single radio and modem unit on the subscriber end.

Q. What services will be offered?

A. The company will market switched and dedicated telecommunications services. Its services will include local exchange telephone service, private local voice networks, high-speed Internet access, switched data services, integrated switched digital network ("ISDN"), frame relay, asynchronous transfer mode ("ATM") services, dedicated data services, and high quality video conferencing.

Q. What will be the initial target market?

A. Associated Communications initially will serve small, medium and large business customers, as well as any businesses and residences located in multi-tenant buildings. Associated Communications also is a "carrier's carrier," selling backhaul network services to other network providers, including interconnection of cell sites for cellular, SMR and PCS operators.

Q. How do the networks compare to those of 28 GHz and 38 GHz providers?

A. Both 28 GHz and 38 GHz bands suffer from inferior propagation characteristics thus necessitating the deployment of many more nodal sites than at 18 GHz (as many as 10 times more). Component costs in these higher bands are greater than those at 18 GHz. These factors mean that both 28 GHz and 38 GHz operators are more likely to have more costly infrastructure requirements as well as potentially less reliable systems.

Q. How do the networks compare with other wireless systems?

A. Many other wireless systems primarily serve mobile subscribers and not fixed locations, including cellular, SMR and PCS systems. Other fixed wireless systems do not offer sufficient bidirectional bandwidth (either based on spectrum availability or technology efficiency) to provide service comparable to those offered by Associated.

Q. Will Associated Communications compete with fiber companies like MFS and Teleport Communications?

A. The networks managed by Associated Communications are complementary to fiber-based networks. Using wireless networks, the company can provide service in many areas where fiber cannot be deployed economically. By using wireless technology to extend the reach of fiber networks, the networks will provide access to a previously unaddressable market segment. While there will inevitably be some overlap of target customer base, the segment of customers who cannot be economically served by fiber but can be economically served by wireless represents a very large revenue opportunity.

LOCAL COMPETITION

Satellite-Based Services

Satellite communications will play an increasingly important role in the GII into the 21st century, providing two-way, high-speed video and data networks. Major players include Hughes, Motorola, Teledesic, Loral/Qualcomm, and TRW. (Steven Dorfman, Sr. VP, Hughes).

Hughes develops satellite product that will compete with LECs' ISDN services. (CTIA headlines, WWW).

SATELLITE COMMUNICATIONS IN THE 21ST CENTURY

Strategies Summit
Telecom '95 (ITU)
Geneva, Switzerland
October 10 , 1995

by Steven D. Dorfman
President, Hughes Telecommunications and Space Company
Senior Vice President,
Hughes Electronics Corporation

Introduction

I believe that satellite communication will play an increasingly important role in the Global Information Infrastructure (GII) into the 21st century.

Since my last presentation here at Telecom '91, 59 geostationary commercial communications satellites have been successfully placed into orbit, 25 of them built by Hughes. Today, there are some 145 of these satellites in geostationary orbit. Also during this time, worldwide demand for satellite communications has increased by 50 percent, fueled by technology advances that have created new applications and improved the cost-efficiency of existing "bread and butter" applications.

As in 1991, satellites remain the primary conduit for video distribution; live news reporting; data transmission for private business networks; and telephone trunking in areas that aren't hard-wired. Plus, in the interim, we've witnessed the expansion of several applications, such as direct-to-home TV via small, inexpensive dishes; and mobile telephony serving trucking fleets, trains, planes, and ships. Perhaps the most important development has been the new role satellites serve in providing "instant telecommunications infrastructure" to the world's developing countries.

As we head into the 21st century, demand for satellite communications will accelerate even faster because of many new mass-consumer technologies already in advanced stages of development. These include high-quality global mobile telephone service via handheld pocketphones. And two-way, high-speed video and data networks for global information exchange-with bandwidth on demand.

In the 21st century, satellites will be the cornerstone of our GII. This is because only satellites can provide ubiquitous coverage to even the most remote areas of the world; untethered global mobile telephone service; and transmission costs that are insensitive to distance.

Proliferation of Satellite Communications

Let's take a more concrete look at the current growth in demand for satellite communications. Since Telecom '91, the number of commercial C- and Ku-band communications satellite transponders worldwide has grown from 1,848 to an anticipated 2,771 by the end of this year. Of this number, 620 serve the United States, and the demand is so intense that only five percent are not fully used. Similarly, some 297 transponders were added to the Asia-Pacific area between 1991 and 1995. And while some believe this market is now saturated, I believe there is significant current unmet demand.

Satellite infrastructure on the ground is experiencing similar growth. At Telecom '91, I estimated that there were approximately eight million privately owned satellite dishes worldwide being used for TV reception. Today that number has grown to 30 million individually owned dishes, and is escalating rapidly. For example, over the past year, nearly one million U.S. consumers have bought 18-inch satellite dishes to receive the new DirecTV and USSB satellite-to-home program services.

Similarly, some 187,000 very small aperture terminal (VSAT) dishes have been purchased to date throughout the world, compared to just 86,000 in 1991. There are some 1,500 individual VSAT networks currently in operation worldwide.1 This number is growing by 30 percent a year, with Hughes Network Systems taking significant market share. Because of their ability to transmit any combination of data, voice, and video, VSAT networks are regarded as essential business tools by a wide range of large and small companies. VSAT networks also rapidly advance the economic and social progress of developing nations, by transporting them electronically into the global marketplace.

Advances in Satellite Technology

The rapid growth in demand for direct-to-home television, VSAT networks, and other satellite-based communications technologies-such as mobile telephony-has been fueled by a number of technology and productivity improvements. These advances have dramatically increased the power, capabilities, and cost-effectiveness of satellite communications, both in space and on the ground.

In fact, in terms of power, bandwidth capacity, and lifetime, the per-dollar cost-effectiveness of today's Hughes HS 601 satellite is 20 times greater than that of our 1980 HS 376 satellite. Hughes' recently announced, more powerful HS 702 satellite will increase cost-effectiveness by another factor of five by the year 2000. Combined with digital communication technology and data compression, the satellites of the 21st century will be more than 500 times as cost-effective as those of the 1980s.

With continued improvements in satellite power and cost-effectiveness, we can expect to see an acceleration in the rate of new satellite applications and private ownership of satellite receivers. For example, let's consider the evolution of direct-to-home satellite TV. Ten years ago, to receive a satellite TV signal could require a three-meter dish costing $30,000. Satellite receivers were a luxury item advertised in the Neiman-Marcus catalogue. Today, because of our more powerful satellites, we can use an 18-inch dish that costs less than $600.

In addition to its low cost, what makes satellite-to-home TV viable as a mass-consumer service is digital compression. Currently, every U.S. household has access to some 200 channels of programming. Digital technology also enables conditional access-giving subscribers added pay-per-view options. Digital direct-to-home TV service will start in Latin America in 1996. I expect it to migrate to Japan and Europe shortly thereafter. Developing countries such as India, China, and Indonesia will follow. I expect that by the early years of the 21st century, direct-to-home TV will have created a global landscape of more than 100 million privately owned satellite dishes.

The Evolution of Satellite Mobile Communications

Similarly, digital communication, working in tandem with today's more powerful satellites, is spurring the rapid proliferation of satellite mobile communications.

The pioneer was Inmarsat, which now serves more than 50,000 terminals deployed globally for the transmission of voice and data. Many are suitcase-size transportable units, which handle calls for an average of $4 to $8 per minute. And while calls or faxes from cruise ships or intercontinental flights are now commonplace conveniences for consumers, they are still relatively expensive. But this is changing through modern compression techniques, along with time division multiplexing and digital speech interpolation. A few years ago, good-quality voice circuits required 64 Kbps. Today, good-quality voice can be achieved with 4.8 Kbps.

The first high-power land mobile systems were launched via L-band piggyback payloads aboard the Australian Optus satellite in 1992 and the Mexican Solidaridad in 1993. And earlier this year, MSat-the first dedicated land mobile satellite communications system-was launched. It's a Hughes HS 601 satellite with two 20-foot reflectors. It was built for the U.S. company American Mobile Satellite Corporation, or AMSC. It will be in service for data and telephony by year end.

A second MSat satellite will be launched next year for the Canadian company TMI. Together, these two satellites will cover North America, providing high-quality mobile phone service in cars, ships, trucks, trains, and planes-for $1 to $2 per minute. I expect that the two satellites' total capacity of 4,000 circuits will be fully used soon into their service lives. Plans for the next generation, which will offer handheld service, are already underway.

LEOs, MEOs, and GEOs

As we transition to handheld satellite mobile telephony beginning later this decade, the composition of our existing constellation of mostly geostationary satellites will change dramatically.

In the 1960s, the debate over whether to use low Earth orbit satellites (LEOs), such as Telstar 1, or geostationary orbit satellites (GEOs), such as Syncom 1, was resolved in favor of the GEOs. This was because of the relatively high cost of the terrestrial antennas needed to track the LEO satellites. For the new handheld satellite mobile communications systems of the 1990s, we will see a mixture of LEOs, GEOs, and also MEOs-medium Earth orbit satellites. At L or S band, there is no need for tracking antennas; omnidirectional antennas will work.

It now appears there will be two major LEO systems: Motorola's 66-satellite Iridium system and the Globalstar system from Loral/Qualcomm, which will require 48 satellites. There will also be at least one, and perhaps two, MEO satellite mobile communications systems. The new Inmarsat affiliate-ICO-has procured a 12-satellite system. Jointly, TRW and Teleglobe also plan a 12-satellite MEO system. There will also be regional GEO systems. For example, the Indian company ASCOM is procuring two high-power HS 601s, with 40-foot reflectors, to provide handheld mobile phone service for India, Asia, Africa, and the Middle East. The Indonesia-Philippines-Thailand consortium called ACES is buying a similar system from Lockheed Martin, to serve Asia-Pacific. There's also the China-Singapore venture, APMT, and I expect there will be similar regional GEO systems that will serve North and South America.

More than $13 billion will be required to build and launch all these various systems. Much of this money has already been raised. To develop narrowband satellite mobile telephony also will require 45 MHz of bandwidth at L and S band.

All the systems I mentioned are planned for deployment in the 1998 through 2000 timeframe. By the first years of the 21st century, at least 250,000 equivalent satellite mobile voice circuits will be in operation worldwide. And I estimate there will be 25 million satellite mobile telephones, many of them handheld.

I predict that the global satellite phone of the early 21st century will be a lightweight pocketphone that will be compatible with both satellite and terrestrial systems. It will incorporate a miniature keyboard and display for full data, fax, and e-mail communications, and will connect us with our PC from anywhere we happen to be in the world. It will also incorporate a Global Positioning System (GPS) position locator so that we and others will know exactly where we are.

Pioneering the Ka Band

Just as demand for satellite mobile telephony will grow in the coming years, so too the demand for high-speed, interactive data exchange will continue to increase. In the 21st century, new two-way, high-speed satellite networks will be needed to meet global demand for broadband information exchange. These networks will operate at Ka band, where there is greater bandwidth available to accommodate the increased demand for high-speed information exchange. These systems will complement today's existing Ku-band VSAT networks.

For example, Hughes has proposed a global GEO system called Spaceway that will provide an interactive, "bandwidth on demand" service accommodating a broad range of digital data interchanges ranging from voice to video-and at costs substantially below today's costs. By employing such technologies as on-board digital signal processing, asynchronous transfer mode switching, and tightly focused spot beams, Spaceway satellites will be able to transmit to ultra-small antennas of 26 inches in diameter with uplink power below a half-Watt. I expect these two-way earth stations to cost consumers less than $1,000.

Craig McCaw and Bill Gates have proposed a Ka-band LEO system called Teledesic that is based on a similar vision of heightened demand for interactive broadband satellite communications in the 21st century. Just two weeks ago, AT&T, Lockheed Martin, and Motorola also proposed systems similar to Spaceway. I expect that as the size and cost of the ground transceivers come down, and as the cost of satellite air time decreases as well, use of both Ku-band VSAT and Ka-band systems like Spaceway and Teledesic will increase dramatically-among both business and individual users.

I believe that by the early years of the 21st century, there will be millions of households worldwide with dual Ku/Ka-band dishes. These households will be able to receive hundreds of TV channels, originating from around the world, and delivering entertainment, information, and education. In addition, these households will have low-cost access to low- and high-speed, two-way voice, data, and video communications. Everyone will have access to the GII.

Privatization and Internationalization

The worldwide growth in satellite communication, fueled by new applications and the developing countries' thirst for telecommunications, will inevitably lead to the privatization and internationalization of satellite communications. These trends are already underway. Since the last Telecom, Australia, Indonesia, and Canada have joined the U.S. and Japan in privatizing their national systems, opening the way to international participation. And Mexico, Brazil, and others are contemplating similar moves.

Further, Binariang of Malaysia, Shinawatra of Thailand, ASCOM of India, the multinational ACES, and Globalstar and Iridium have all started as privately financed companies-some with franchise agreements with their countries. The significant capital required for satellite systems makes this approach inevitable, and I expect to see more and more capital raised in public and private equity and debt markets, and ownership in the hands of international investors rather than governments.

Because satellites don't readily recognize borders, I expect the traditional distinction between national and international systems to end in the 21st century. This change is already underway. Virtually all the national satellite systems going into the Asia-Pacific region offer international coverage. PanAmSat, the first private international satellite company, recently announced its seventh and eighth satellites. The newly announced ICO, Globalstar, Iridium, Spaceway, and Teledesic systems are all global.

On the other hand, the amount of Intelsat capacity being used for domestic national communications is approaching 30 percent. The original international communications charter for Intelsat is an anachronism. Both Intelsat and Inmarsat will have to change to reflect these new realities.

In 1991, there were 25 entities that owned satellites in orbit, and 36 percent were privately owned. Today there are 34 satellite owners, and 56 percent of them are private. By the 21st century, I expect there to be more than 50 satellite owners, virtually all private. This will represent a significant challenge to regulators, and especially the International Telecommunication Union (ITU), to efficiently allocate orbital spectrum as ownership shifts from government to private hands and new satellite systems are orbited.

Consider that from now through the remainder of the decade, more than 350 LEO, MEO, and GEO commercial communications satellites are expected to be launched. And this number does not count any of the 840 Teledesic satellites. The ITU will be required to change the way it allocates satellite spectrum. The current frequencies need to be allocated and used more efficiently, and new frequencies need to be opened up.

Accommodating 21st Century Demand for Satellite Communications

For example, in the FSS band-at both C and Ku-some satellite systems use only a small percentage of the spectrum they have been allocated and, at the same time, make it impossible for others to collocate at the orbital slot. Another serious problem in the FSS band is that there is anarchy at some parts of the orbital arc. Regulations relating to spacing and frequency coordination are routinely ignored. Meanwhile, speculation and warehousing are becoming more prevalent.

A new discipline needs to be applied in the FSS band. First, policies promoting uniform spacing and frequency coordination rules are essential. Also, the entire amount of allocated frequency should be used at each orbital slot. And policies and procedures are needed to ensure that a satellite is launched in a reasonable amount of time following allocation of an orbital slot-the current nine years is far too long.

In the BSS band, we need to change the rules so that unused spectrum can be made available for a broad range of uses. Today, only seven percent of the channels allocated at WARC '77 are being used in Regions I and III, and only two percent of the channels allocated at WARC '83 are being used in Region II. This represents a total of 10 orbital slots for Regions I, II, and III. By contrast, there are 98 orbital slots with C-band payloads and 96 orbital slots with Ku-band payloads in the FSS allocated frequency bands.

I suggest that we modify the BSS rules, which are technically and politically outdated, and release these slots for a broader range of satellite communications-including, but not limited to, direct-to-home. If the only constraint were four-degree spacing-to permit the use of small dishes-perhaps another 50 to 100 slots could be added worldwide.

Although use of the Ka band will provide for future growth of satellite communications, a recent decision by the U.S. Federal Communications Commission (FCC) could put serious limitations on the availability of this resource. By allocating for terrestrial video distribution 1000 MHz of the 2500 MHz previously allocated for satellite communications, the FCC has set a dangerous precedent that we hope won't be repeated internationally.

Finally, the ITU needs to deal quickly and fairly with the global allocation of L and S band for satellite mobile communications, so that all the LEO, MEO, and GEO systems can be used most cost-efficiently.

The 1995 World Radiocommunication Conference (WRC) will focus on all these issues, and the WRC members must have the political will to make the required changes, if we are successfully to meet the growing demand for satellite communications in the 21st century. I'm confident that the ITU will resolve the outstanding issues promptly, because it must believe, as I do, that satellite communication is a powerful force for the success of the global economy and the improvement of the quality of life in developing and developed countries.

Thank you.

References

1. VSAT estimates provided by S. Bull, Communications Systems, Ltd., St. Albans, England.

By the end of the year, the New York Stock Exchange will finish a wireless LAN system as part of $125 million technological upgrade that was started two years ago. Hand-held computers will be distributed to roughly 1,400 brokers, who can use the devices to send customer orders to the point of sale immediately. William Bautz, the chief technology officer of the NYSE, says the system will allow traders "to manage their orders more efficiently and that is an enhanced service to clients." NYSE spokesman Ray Pellecchia says NYSE employees have been using wireless communications to report trades and that the technology will soon be provided to brokers. GTE is the systems integrator for the project, and it has contracted Symbol Technologies to provide the LAN and Hewlett-Packard to supply software and other computer equipment. Roughly 100 options brokers at the American Stock Exchange also use wireless LAN technology, and in a year, equities traders will have access to the system as well.

"Hughes Provides Satellite Link"
LAN (09/96) Vol. 11, No. 9; P. 18; Karve, Anita

Hughes Network Systems, Helius, and Cisco Systems have joined forces to create DirecPC for NetWare, based on a product introduced by Hughes in 1994. Hughes supplies a 21-inch dish and ISA card for the NetWare server, Cisco provides Internet Junction IPX-to-TCP/IP software, and Helius designed software that handles communication from satellite to LAN. Jack Malone, a marketing official with Hughes, says the new product will compete against ISDN. Malone notes that "companies with remote locations that might be evaluating other switched services such as ISDN or 56 Kbps links" might consider this product. DirecPC offers a Turbo Internet feature which enables users to contact their Internet service operator through a standard browser and request information over a modem. Downloads from the satellite connection can travel at speeds up to 400 Kbps, more than three times the rate of ISDN. DirecPC is also available with a Digital Package Delivery service, which allows data to be sent to multiple locations during a single transmission. The data is transmitted at 3 Mbps, twice the rate of a full T-1 line. An office with five clients getting both the Turbo and the Digital Package features pays an initial fee of close to $2,300 for materials. The use of both systems with up to 150 MB of downloaded data costs $15.99 a month.

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